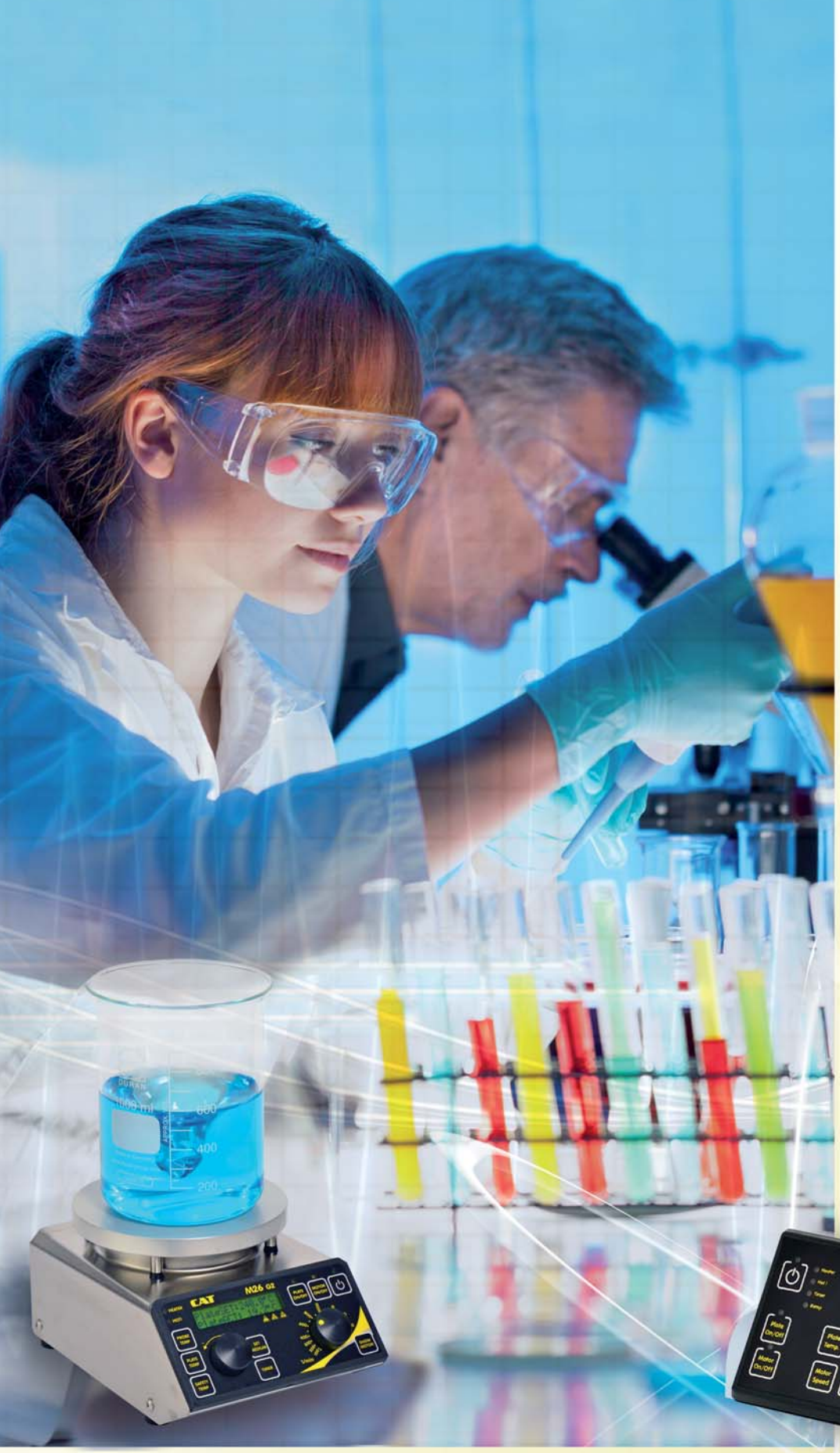


CAT

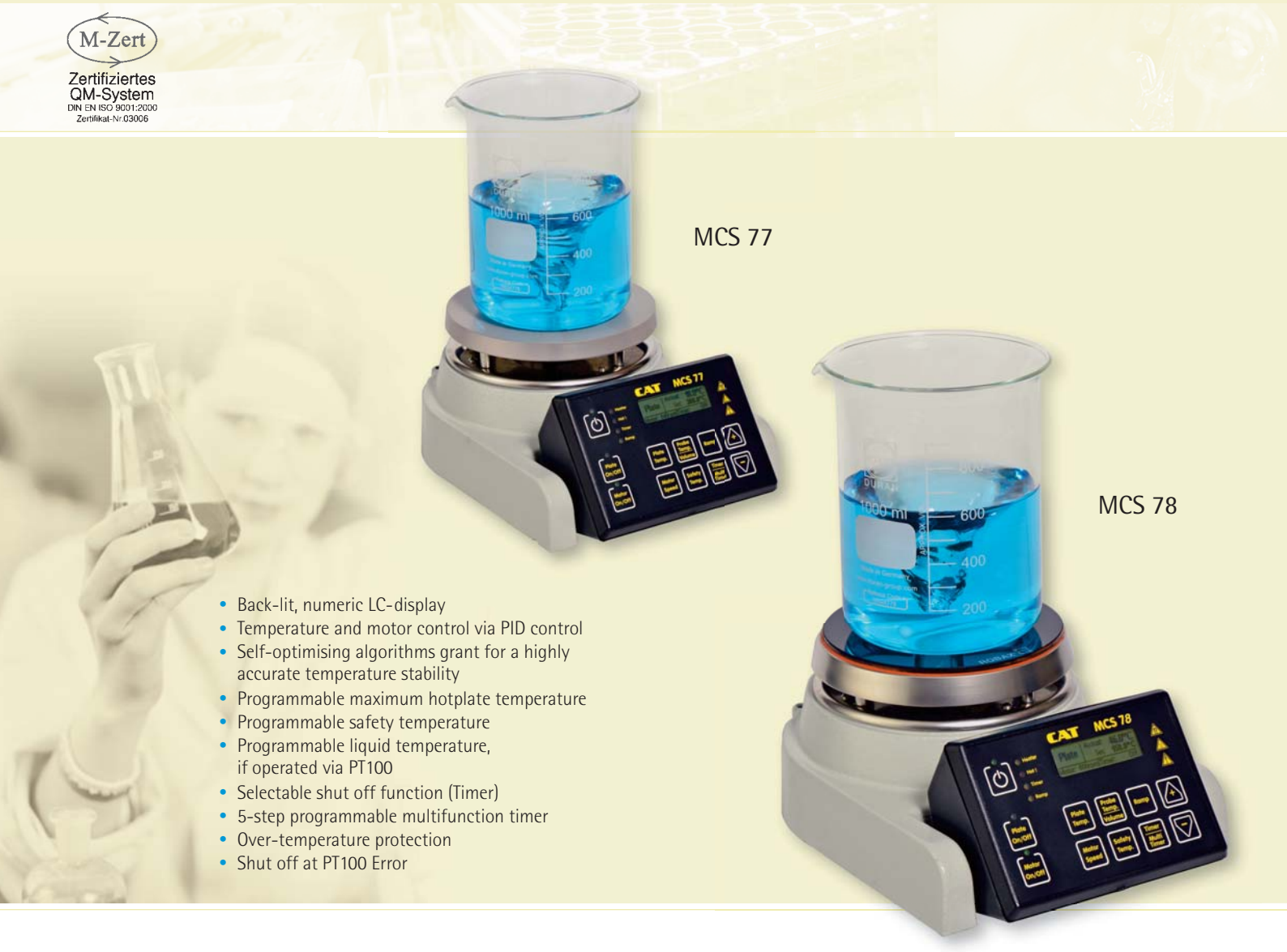
Ingenieurbüro
M. Zipperer GmbH

From marketing knowledge to real innovation

Magnetic Stirrers

Ingenieurbüro CAT
M. Zipperer GmbH
Etzenbach 16
D 79219 Staufen
Telefon 07636/7803-0
Telefax 07636/7803-45
info@cat-ing.de · www.cat-ing.de

M-Zert
Zertifiziertes QM-System
DIN EN ISO 9001:2000
Zertifikat-Nr:03006



- Back-lit, numeric LC-display
- Temperature and motor control via PID control
- Self-optimising algorithms grant for a highly accurate temperature stability
- Programmable maximum hotplate temperature
- Programmable safety temperature
- Programmable liquid temperature, if operated via PT100
- Selectable shut off function (Timer)
- 5-step programmable multifunction timer
- Over-temperature protection
- Shut off at PT100 Error

Hotplate Magnetic Stirrer MCS 77 / MCS 78

With modern microprocessor technology self monitoring and programmable magnetic stirrers found their way into today's labs. The RS485 interface provides for networking with other lab equipment and a computer.

The instrument has a rotating easily viewable solvent-proof membrane key pad to controls all functions.

The PID control of the liquid and hotplate temperatures makes sure for fastest heat up time without overshoot and temperature stability.

A 5-step timer system allows for generation of user-defined temperature and stirring profiles. For each timer step the following parameter can be defined: hotplate and sensor temperature (liquid), motor speed, temperature-slope.

The case is made of acid resistant coated aluminium and is protected against liquid penetration. Active and passive safety features protect from risks such as overheating of the hotplate or the medium to be stirred. The unit shuts down if a short circuit or failure of the external PT100 probe is sensed, but also if the temperature probe gets out of liquid.

Additional there are extensive „watchdog"-parallel back-up circuits to prevent from failures of the microprocessor or heating.

The motor speed is optoelectronically measured and precisely readjusted, of course with soft-start for smooth acceleration of the stirring bar.

Hotplate Stirring System M 26 G2

Modern Microprocessor Technology Provides for Active and Passive Safety within the Hotplate Stirring System M 26

The M 26 is a compact and totally integrated hotplate stirrer system, featuring PID control through a powerful microprocessor.

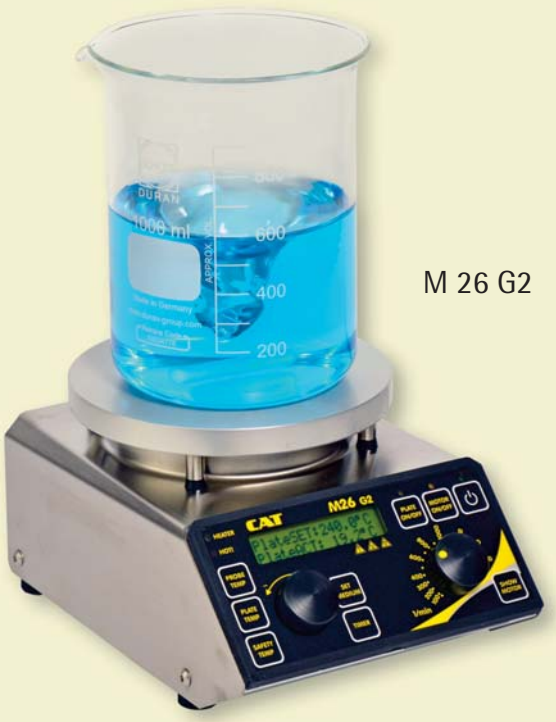
This grants at plainest operation a maximum of accuracy and safety. Data is displayed on an easy-to-read, back-lit LCD which shows actual values, operating hints and any operating messages.

Data is entered via an encoder-wheel, the acid-proof membrane key-pad and the speed setting knob. Selected user settings are automatically protected against unintentional changes. The integrated timer enables the M 26 to switch off after a programmed time has expired.

The unit has been developed for discerning users who value safety as paramount in their laboratories. A second PT100 sensor can be connected to the M 26 to switch off the unit if a pre-set safety temperature is reached.

Please find following a description of the safety features:

The top of our line for 24 hours and 7 days a week

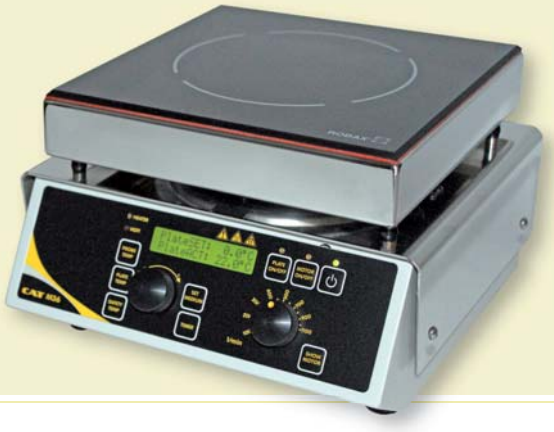


M 26 G2

Features of the M 26 G2:

- Out-of-liquid alarm when PT100 is not immersed in liquid
- Monitors for short-circuit and sensor failures
- Internal high-temperature monitor
- Watchdog parallel back-up circuit
- Adjustable safety temperature
- Adjustable parallel back-up circuit via 2nd PT100 sensor, adjustable shut off temperature from RT-280°C
- Adjustable hotplate temperature limitation
- Programmable temperature ramp
- RS485-interface
- Programmable timer function

M 36



Differential alarm - the safety power cut-out

Failure of the stirring vessel could create a hazardous situation, so to solve this problem this instrument has a "differential alarm" feature. The "differential alarm" switches the unit off if the probe has fallen out of the liquid (e.g. failure of the stirring vessel, breakage of glass).

Out of liquid check

The M 26 monitors, whether the PT100 tip is immersed in liquid. The microprocessor checks whether the probe temperature changes in relation to the temperature changes of the hotplate. If the microprocessor detects no increase in the liquid temperature over a certain time, although the hotplate temperature is rising the following happens:

1. Heating function shuts off
2. Stirring function continues
3. A warning message is shown on the display
4. The hotplate is switched off and the M 26 shuts down after a preset time

Failure of temperature probe

Disconnection or failure of a temperature probe (internal or external) will disable the heating of the hotplate. The shut down reason will be shown on the display the next time the unit is switched on.

Hotplate Stirring System M 36

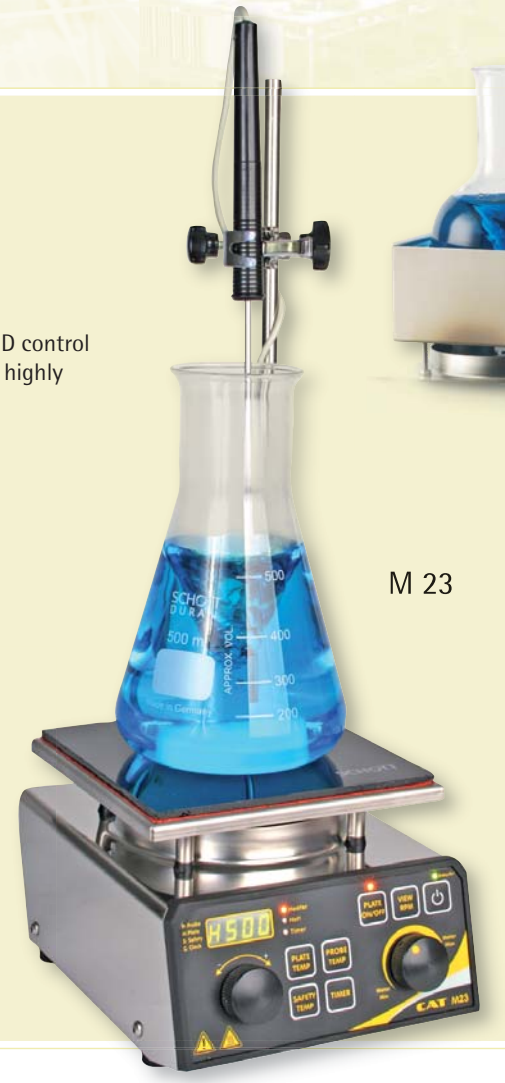
Same features as M 26 G2 but without a second PT100 sensor. Technical details please see the table below.

		Stirring Quantity (H_2O)	Working Area Size (mm)	Material	Speed Range	Heating Power	Temp.-range (C°)	Connection for external Probe	Derivation	Safety Circuits	Dimensions W x D x H	Weights kg	Other Features
Model	**Part No.**	**Safety Hotplate Stirrers microprocessor controlled**											
M 26 G2	**60279-00**	10l	○140	Eloxal	60-1600	500 W	40-360	PT100/Duplex/KTA	±0,2°C	2	148x209x110	2,6	Timer, Temp.-Ramps, RS485
M 36	**60253-00**	10l	□140	Eloxal	60-1100	1200 W	40-500	1xPT100/KTA	±0,2°C	1	148x209x110	2,6	Timer, Temp.-Ramps, RS485
MCS 77	**60276-00**	10l	○135	Eloxal	60-1600	500 W	40-330	PT100/KTA	±0,2°C	1	180x245x100	2,8	5stufiger Timer, Temp.-Ramps, RS485
MCS 78	**60277-00**	10l	○125	Ceran®	60-1600	600 W	40-440	PT100/KTA		1	180x245x100	3	5stufiger Timer, Temp.-Ramps, RS485

M-Zert
Zertifiziertes QM-System
DIN EN ISO 9001:2000
Zertifikat-Nr:03006

Hotplates to choose

- 4Digit LED Display
- Display of set and actual values
- Temperature- and motor control via PID control
- Self-optimising algorithms grant for a highly accurate temperature stability
- Soft-start of motor




KM 16.4


M 21 v2A


M 22 Eloxal


KM 16.7


M 23 Ceran

M 21 stainless steel hotplate
M 22 anodised aluminium hotplate (Eloxal)
M 23 CERAN®

The **Ingenieurbüro CAT** mid range hotplate stirrers M 21, M 22 and the CERAN® hotplate stirrer M 23 feature direct display and set of plate, probe and safety temperatures on the front panel of the instrument. Set temperatures, safety temperature as well as the programmable switch-off timer can be easily set via an incremental encoder wheel. All parameters can be monitored on a 4-digit LED display which allows also for monitoring the set motor speed.

These hotplate stirrers all have superb performance such as soft-start for the stirring motor, PID control of the liquid and hotplate temperatures for fastest heat up time without overshoot and temperature stability, acid resistant epoxy-finished chassis and grade 304 stainless steel covers, combined with a stainless steel shroud between hotplate and cover to avoid the entrance of spills into the interior. All three models are available with RS485-interface which enables easy setting and readout of all relevant parameters

Magnetic Stirrer with Heating Capability for Round-bottom Flasks KM 16.4 / KM 16.7

These magnetic stirrers/heaters are developed for heating round-bottom flasks as well as three-neck flasks. The heat transfer is done through radiation and direct surface contact with an aluminum block in the shape of round-bottom flasks. The heating block with the flask is surrounded by a stainless steel container. When breaking of glass occurs, the liquid is collected in this stainless steel container.

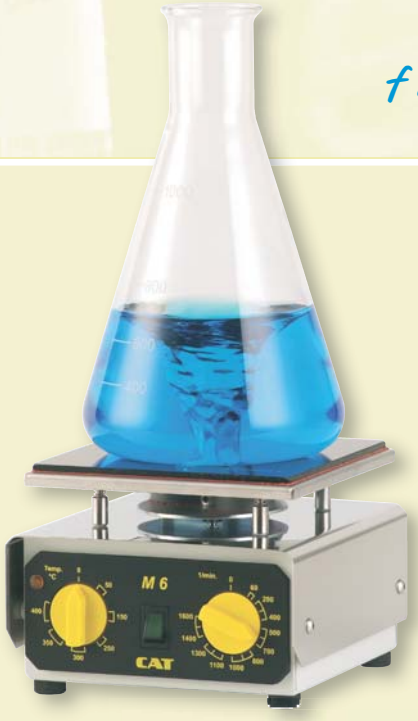
The liquid is stirred by an oval stirring bar so that hot spots do not appear. Temperature ramping therefore is going smoothly.

Different covers are delivered with the instrument so that the heat will remain in the stainless steel container. This improves fast heating. The KM 16.4D and KM 16.7D are equipped with a display for direct reading of the heating block temperature or the liquid temperature through an external PT100 sensor.

The following parameters can be adjusted: Temperature of the heating block, external PT100 sensor, maximum temperature (for security), timer function, rpm for the stirrer.

		Stirring Quantity (H_2O)	Working Area Size (mm)	Material	Speed Range	Heating Power	Temp.-range (C°)	Connection for external Probe	Derivation	Independent Safety Circuits	Dimensions W x D x H	Weights kg	Other Features
Model	**Part No.**	**Hotplate Stirrers microprocessor controlled**											
M 23	**60263-00**	10l	□135	Ceran®	60-1600	600 W	40-500	PT100	±1°C	1	150x184x110	2,6	PID-logic Control
M 22	**60264-00**	10l	○140	Eloxal	60-1600	500 W	40-380	PT100	±1°C	1	150x184x105	2,4	PPID-logic Control
M 21	**60262-00**	10l	○130	V2A	60-1600	500 W	40-350	PT100	±1°C	1	150x184x105	2,4	PID-logic Control
KM 16.4D	**60257-00**	100/250/500			60-1100	500 W	40-450	PT100				2,6	PID-logic Control
KM 16.7D	**60258-00**	1000/2000			60-1100	500 W	40-450	PT100				2,6	PID-logic Control

for day to day lab routine

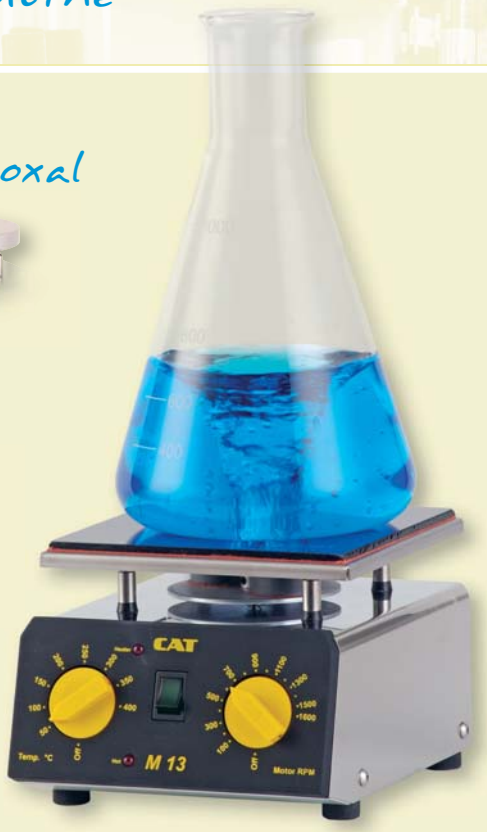


M 6

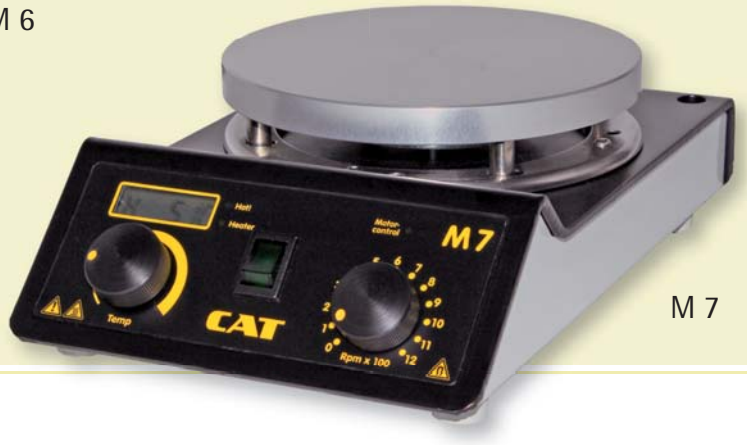
M 6.1 v2A

M 6.2 Eloxal

M 6 Ceran



M 13



M 7

Hotplate Stirrers for the daily Lab Routine

This group of compact, robust stirrers has been developed for general stirring tasks in today's busy laboratory. Analogue controlled hotplates, brushless motors with opto-electronic speed control, embedded heater coils, **Ingenieurbüro CAT** splash-proof construction with stainless steel covers give a long term trouble-free life.

Safety Functions for Connection of Contact Thermometers

Models M 11, M 12 and M 13 each provide a socket for contact thermometers (CTC) and a safety monitoring circuit which controls the external probe. An error message during operation (e.g. broken CTC) shuts the hotplate down.

Hotplate Stirring System M 7

These magnetic stirrer system is microprocessor controlled with digital display. The display shows temperature and speed.

Amenities and options:

- 4Digit LED Display
- Display of set and actual values
- Temperature- and motor control via PID control
- Self-optimising algorithms grant for a highly accurate temperature stability
- Soft-start of motor

Hotplate stirrers M 6, M 6.1 and M 6.2 are economically prised models without contact thermometer connection.

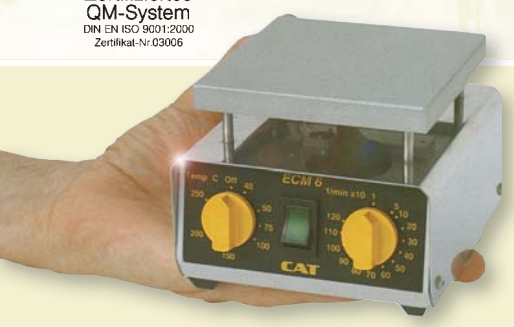
Hotplate Stirring System ECM 6

continued on the next page.

Model	Part No.	Stirring Quantity (H_2O)	Working Area Size (mm)	Material	Speed Range	Heating Power	Temp.-range (C°)	Connection for external Probe	Derivation	Safety Circuits	Dimensions W x D x H	Weights kg	Other Features
Standard Hotplate Stirrers													
M 13	**60272-00**	10l	□135	Ceran®	100-1600	600 W	40-400	KTA			150x184x105	2,6	
M 7	**60367-00**	10l	○140	Eloxal	25-1200	500 W	RT-320	Ja			152x236x75		
M 6	**60266-00**	10l	□135	Ceran®	80-1600	600 W	40-400				150x157x105	2,4	
M 6.1	**60268-00**	10l	○130	V2A	80-1600	500 W	40-330				150x157x105	2,2	
M 6.2	**60269-00**	10l	○140	Eloxal	80-1600	500 W	40-330				150x157x105	2,3	
ECM 6	**60256-00**	1l	□90	Eloxal	10-1200	160 W	40-250				100x110x80	1	

M-Zert
Zertifiziertes QM-System
DIN EN ISO 9001:2000
Zertifikat-Nr.:03006

A big variety

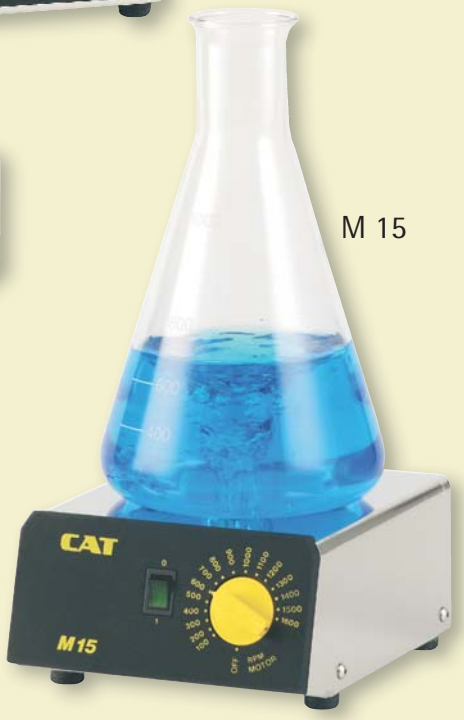


ECM 6

M 20

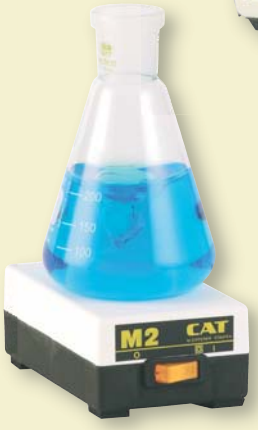
- Warum mit 600 Watt heizen, wenn 200 Watt ausreichen?
- Warum mit 40 Watt rühren, wenn 2-6 Watt reichen?
- Müssen es Probemengen von 500ml sein, tun es nicht auch 50ml oder sogar weniger?
- Warum unsere Labortische mit großen Standardgeräten vollstellen, wenn das auch viel kleiner geht?
- Klein, umweltfreundlich und dabei leistungsstark.

ECM 5



M 15

ECM 2



M 2

Compact, energy and space-saving magnetic stirrers

Early on **Ingenieurbüro CAT** recognised the need for space-saving stirrers in today's crowded laboratory environment. Also, people are becoming conscious that energy-saving is important.

ECM 6

Smallest hotplate stirrer. The Eloxal hotplate is only 90x 90 mm and heats 200 ml water in ca. 13 min to 100°C. The brushless motor enables precise speed control from 10-1200/min

ECM 2/5

non-heating version of ECM 6

ECM 2

Energy and space-saving stirrer 2-200/min

ECM 5

Energy and space-saving stirrer 10-1200/min

M 2

Low-cost magnetic stirrer for simple stirring tasks. The stirrer comes in a closed polypropylene housing with white cover for titration, brushless motor, 500 rpm.

Magnetic Stirrers without heating

There is a choice of 6 different models. They all have brushless motors with electronic feed-back speed control. This means changes in viscosity of the media or voltage fluctuation do not influence the set speed.
A soft-start feature prevents stir-bar de-coupling.

Compact splash-proof construction with 304 grade stainless steel cover.

M 5

Standard unit, feed-back speed control

M 15

Microprocessor controlled

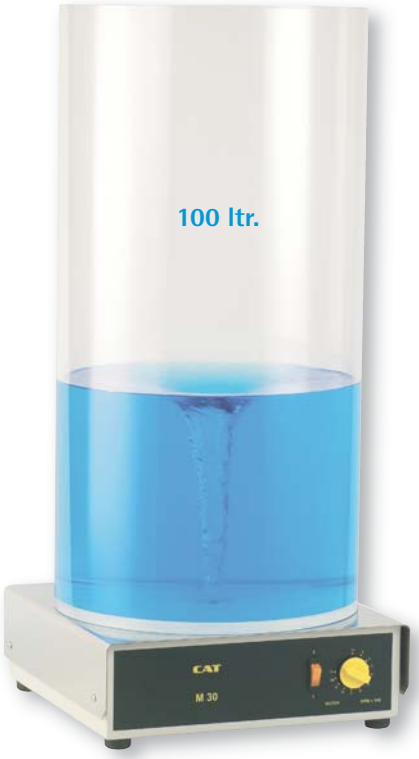
For large volumes:

M 20.20

for volumes up to 50 l H2O, 100-1100/min

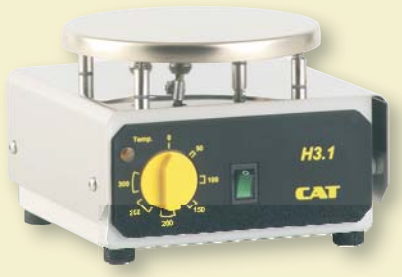
M3 0.30

for volumes up to 100 l H2O, 100-1100/min



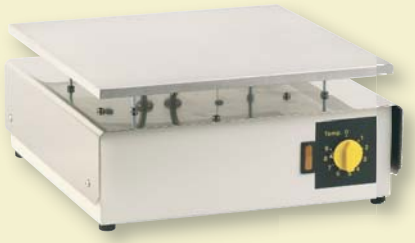
for all kinds of applications

HEATING ONLY



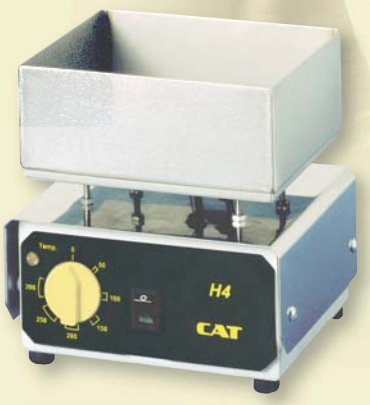
H 3.1

H 17.5 D

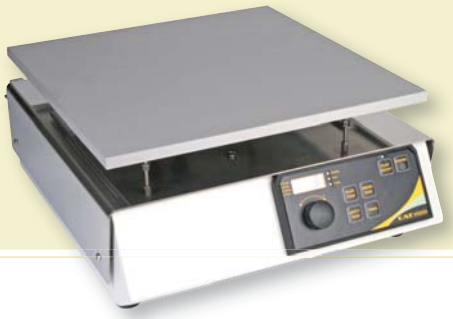


H 3030

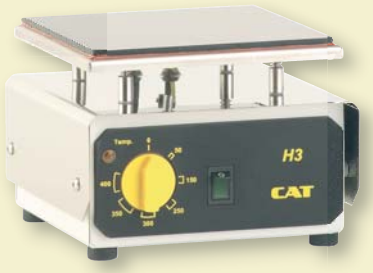
H 4



H 30 D



H 3



Hotplates

Hotplates are mainly used to heat aqueous solutions in glass vessels without flammable contents. Since the hotplates of the units become very hot it has to be determined by the user whether a dangerous situation may arise.

Hotplate Model H 3

A laboratory heater made for high demands. The heating platform is made of CERAN® , (Schott & Gen.) and is guaranteed to remain a flat surface even after many thermal shocks. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control.

Hotplate Model H 3.1

A laboratory heater made for high demands. The heating platform is made of stainless steel. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control.

Sandbath, Model H 4

A laboratory sandbath for heating sand, oil and other liquids, etc. The heating unit consists of a sealed IR-radiant enclosed in stainless steel. The sandbath itself is made of stainless steel and measures 140 x 140 x 55 mm with a capacity of over 1000ml. The temperature is regulated by a thermostat.

Hotplates H 30/30, H 30/45, H 30/60

The aluminium hotplates of this series feature a precise temperature control The surfaces of the hotplates will remain a flat even after many thermal shocks this means there is optimum contact between hotplate and vessel to guarantee for an even heating of the liquid. The heating consists of a sealed IR-radiant heater covered with stainless steel to insure optimum resistance to acids and alkalis. A thermostatic temperature control unit allows for stepless temperature control. The thermostat stops the heat up procedure as soon as the set temperature has been reached. The desired temperature is set at the temperature control knob (0-300°C). A signal lamp indicates the operation of the hotplate is. The lamp is illuminated as long as energy is supplied to reach the set temperature.

Hotplates H 30/30C, H 30/45C, H 60/30C

Same units as described above but with CERAN® hotplate and a temperature range from 0-400°C.

Hotplate H 17.5D

The **Ingenieurbüro CAT** hotplate H17.5 with CERAN® hotplate features direct display and set of plate, probe and safety temperatures on the front panel of the instrument. Set temperatures, safety temperature as well as the programmable switch-off timer can be easily set via an incremental encoder wheel. All parameters can be monitored on a 4-digit LED-display. This hotplate has superb performance such as fuzzy logic control of the liquid and hotplate temperatures for fastest heat up time without overshoot and temperature stability, acid resistant epoxy-finished chassis and grade 304 stainless steel covers, combined with a stainless steel shroud between hotplate and cover to avoid the entrance of spills into the interior.
This model is also available with RS232-interface which enables easy setting and readout of all relevant parameters.

No. 8MA.ST.E/A

Magnetic Stirrers

Model	Part No.	Stirring Quantity (H_2O)	Working Area Size (mm)	Material	Speed Range	Heating Power	Temp.-range (C°)	Connection for external Probe	Derivation	Independent Safety Circuits	Dimensions W x D x H	Weights kg	Other Features
Magnetic Stirrers													
M 2	**60260-00**	1l	75x130	Polypropylen	500						80x150x50	0,28	
M 5	**60265-00**	10l	□150	V2A	80-1600						157x157x80	1,8	
ECM 2	**60252-00**	1l	□100	V2A	2-200						100x110x57	0,8	
ECM 5	**60255-00**	1l	□100	V2A	10-1200						100x110x57	0,8	
M 15	**60261-00**	10l	145x160	V2A	60-1600						150x184x80	2	
M 20.20	**60253-00**	50l	210x245	V2A	100-1100						210x245x100	4,5	
M 30.30	**60254-00**	100l	300x310	V2A	100-1100						300x310x100	6,5	

Hotplates

Model	Part No.	Volume (H_2O)	Plate Size Dimensions (mm)	Material	Heating Power	Temp.-range (C°)	Connection for Probe	Deviation with Probe	Independent Safety Circuits	Overall Dementions W x D x H	Weight kg	Other Features
Safety Unit microprocessor controlled												
H 17.5D	**60228-00**		□125	Ceran®	600 W	RT-500	PT100	±1°C	2	150x184x110	2,6	Fuzzy-logic Control
Standard Units												
H 3	**60223-00**		□135	Ceran®	600W	40-400				151x157x110	1,9	
H 3.1	**60225-00**		○130	V2A	500W	40-300				151x157x110	1,8	
H 4	**60224-00**		140x140x55	V2A	600W	40-300				151x157x165	1,8	
H 30/30	**60226-10**		300x300	Eloxal	2000W	40-350				311x315x140	7,8	
H 30/30C	**60226-30**		300x300	Ceran®	2000W	40-450				311x315x147	7,9	
H 30/45	**60226-20**		300x450	Eloxal	2000W	40-350				311x315x145	11,6	
H 30/45C	**60226-40**		300x450	Ceran®	2000W	40-400				463x316x147	11,7	
H 60/30	**60226-60**		600x300	Eloxal	4000W	40-350				610x315x145	12	
H 60/30C	**60227-70**		600x300	Ceran®	4000W	40-400				610x315x147	12	

Note regarding the various hotplates

Types M 6, M 13, M 23 und MCS 78

These hotplate stirrers are equipped with a CERAN® hotplate with 600 W heating power. CERAN® glass ceramic is mostly chemically resistant. The heating surface stays constantly straight and is easy to clean. The slightly soiled heating surface can be cleaned (when hand-warm or cold) with water and a few drops of washing-up liquid. Underneath the CERAN® plate there is a closed heating coil which is embedded in a stainless steel tubing filled with quartz sand. The heat is mainly transferred by heat radiation.

Types M 6-1, M 11 und M 21

These hotplate stirrers are equipped with a round stainless steel hotplate with 500 W heating power. For easy cleaning the surface of these hotplates are high-gloss finished. It is possible that the hotplate vaults to the inside after some time due to thermal expansion of stainless steel. The heat is transferred by heat conduction.

Types ECM 6, M 6-2, M 12, M 22, M 26 und MCS 77

These hotplate stirrers are equipped with an aluminium hotplate. The hotplates of M 6-2 up to MCS 66 are heated via a closed stainless steel heating coil with 500 Watt heating power; the heating power of type ECM 6 is 160 Watt. The surfaces of these hotplates are anodised and therefore mostly chemically and mechanically resistant. The heat is transferred by heat conduction.